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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/510,479	10/07/2004	Seitaro Matsuo	T0203.0008/P0008	7443
24998 7590 01/11/2007 DICKSTEIN SHAPIRO LLP 1825 EYE STREET NW Washington, DC 20006-5403			EXAMINER DHINGRA, RAKESH KUMAR	
			ART UNIT	PAPER NUMBER
			1763	
SHORTENED STATUTORY PERIOD OF RESPONSE		MAIL DATE	DELIVERY MODE	
3 MONTHS		01/11/2007	PAPER	

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/510,479	MATSUO ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Rakesh K. Dhingra	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 11 October 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                                   | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)               | Paper No(s)/Mail Date. _____  |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>10/06</u>   | 6) <input type="checkbox"/> Other: _____                                    |

***DETAILED ACTION***

***Information Disclosure Statement***

The information disclosure statement filed 10/6/06 fails to comply with 37 CFR 1.98(a)(3) because it does not include a concise explanation of the relevance, as it is presently understood by the individual designated in 37 CFR 1.56(c) most knowledgeable about the content of the information, of each patent listed that is not in the English language. In this case no English abstract for the foreign document No. EP 0739155 has been supplied by the applicant. It has been placed in the application file, but the information referred to therein has not been considered.

***Response to Arguments***

Applicant has amended independent claims 1, 7 by adding new limitations "and straight shape", "the side of".

Applicant's arguments, see pages 6-8, filed 10/11/06, with respect to the rejection(s) of claim(s) 1 under 35 USC 103 (a) clarifying the difference in slot interval between invention and the prior art have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of new reference (EP 1 032 097 A2) that when combined with Yoshiki et al and Shinji et al reads on amended claim 1 limitations. Accordingly claim 1 has been rejected under 35 USC 103 (a) as explained below. Further, remaining claims 2-12 have also been rejected under 35 USC 103 (a) as explained below.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter

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sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

**Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshiki et al (US Patent No. 5,843,236) in view of Ohmi et al (EP 1 032 097 A2) and Shinji et al (JP 62-152127).**

Regarding Claim 1: Yoshiki et al teach a microwave plasma apparatus (Figures 1, 2, 8) comprising:

a plasma generation chamber 7 with an opening;

electro-magnetic coils 10 and magnet 10c for generating static magnetic field in the plasma chamber (magnetic generation means comprising of magnetic coils 20, 21 – page 9, lines 20-26 of specification);

a hollow waveguide with straight shape 18 with termination 19 at its end and with plurality of slots 18 in the side face of the waveguide, and a microwave window 16 (microwave introducing means comprising of hollow waveguide 35 and microwave introducing aperture 36 – page 9, line 27 to page 10, line 20 of specification). Yoshiki et al also teach that by shifting the position of long slots 18b and 18c the strong and weak portions of the electric fields of microwaves can be superimposed on each other and power of microwaves radiated to plasma chamber can be made more uniform over a wide range of area (column 8, lines 35-65 and column 15, line 10 to column 17, line 40).

Yoshiki et al do not explicitly teach spacing between slots as  $\lambda/2$  to enable introduction of in-phase microwaves into the plasma generation chamber, and also do not teach rectangular shapes of plasma generating chamber, its rectangular opening and magnetic coils with rectangular shape.

Ohmi et al teach (Figure 12) slotted waveguides 101a, 101b with slots 110 through which microwave energy is introduced via a window 115 into a laser tube 102. Ohmi et al further teach that when the pitch of slots is  $\lambda/2$  in-phase microwaves are emitted from the plurality of slots (paragraph 0101).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to keep the interval between slots as  $\lambda/2$  as taught by Ohmi et al in the apparatus of Yoshiki et al to obtain microwaves whose currents and electric fields are oriented in the same direction, thereby allowing more uniform excitation in the chamber.

Yoshiki et al in view of Ohmi et al do not teach rectangular shapes of plasma generating chamber, its opening and magnetic coils.

Shinji et al teach an apparatus (Figures 1, 2) that includes a rectangular plasma chamber 1 having a rectangular outlet 1d and rectangular shaped magnetic coil 4 (Abstract).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use rectangular shaped plasma chamber with rectangular opening and rectangular shaped magnetic coil as taught by Shinji et al in the apparatus of Yoshiki et al in view of Ohmi et al enable process a rectangular specimen uniformly.

**Claims 2-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshiki et al (US Patent No. 5,843,236) in view of Ohmi et al (EP 1 032 097 A2) and Shinji et al (JP 62-152127) as applied to Claim 1 and further in view of Hiroshi et al (US Patent No. 5,389,154).**

Regarding Claims 2,3: Yoshiki et al in view of Ohmi et al and Shinji et al teach all limitations of the claim except that microwave introducing means includes microwave branching means.

Hiroshi et al teach an ECR plasma apparatus (Figure 1) comprising:

a plasma generation chamber 20, magnetic coils 50, waveguide 33 with dividing circuit 64 (microwave branching means comprising of microwave branching portion 37 – page 16, lines 15-25 of specification) [column 6, lines 40-60].

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use microwave introducing means that includes branching and binding means as taught by Hiroshi et al in the apparatus of Yoshiki et al in view of Ohmi et al and Shinji et al to enable control formation of nodes and the phase of the magnetic fields of microwaves (column 7, lines 15-50).

Regarding Claims 4, 6: Yoshida et al teach the apparatus comprises rolls 14, 15 (sample moving means for moving large sized objects- page 8, lines 10-22 of specification) around which a sheet shaped object 13 (rectangular area of surface of sample) to be processed is wound and moved for processing the same (page 15, lines 60-67).

Regarding Claim 5: Hiroshi et al teach that the apparatus is an ECR plasma apparatus.

**Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshiki et al (US Patent No. 5,843,236) in view of Ohmi et al (EP 1 032 097 A2), Shinji et al (JP 62-152127) and Kou et al (US Patent No. 6,246,175).**

Regarding Claim 7: Yoshiki et al in view of Ohmi et al and Shinji et al teach all limitations of the claim (as explained above under claim 1) including straight shaped waveguide 18 with openings 18b, 18c and where the interval between openings is  $\lambda/2$  to obtain emission of in-phase microwaves from the plurality of openings.

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Yoshiki et al in view of Ohmi et al and Shinji et al do not teach microwave introduction means include resonant cavity with first and second openings.

Kou et al teach a plasma apparatus (Figures 1, 2, 5, 6) comprising a processing chamber 60 and a microwave introduction means having a cavity resonator 100 (microwave introduction means with cavity resonator comprising of a first terminal end and a second terminal end with an opening – page 13, lines 8-15 of the specification) with a first terminal end 11 and a second terminal end with opening 12, and plurality of second openings (to locate windows 64). Kou et al also teach that distance between a terminal end of the cavity and the other end having first opening 12 is a design parameter and is set such that resonant condition is maintained in the cavity. Kou et al further teach that distance between a terminal end of the cavity and the end having first opening is:  $49 \times 11 = 539$  mm or 53.9 cm, which includes the range given in the claim formula (that is,  $\lambda_{\text{sub.g}} / 2 \times n$ , where  $n$  is 3 or more and  $\lambda_{\text{sub.g}}$  is approx. 12.24 cm for frequency of 2.45 GHz). It would be obvious to optimize the distance between a terminal end of the cavity and the other end having an opening as per related process parameters including resonant frequency of microwaves (column 3, line 10 to column 6, line 50).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use microwave cavity resonator as taught by Kou et al in the apparatus of Yoshiki et al in view of Ohmi et al and Shinji et al to achieve high electric field density for processing large area substrates (column 2, lines 20-35).

**Claims 8-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshiki et al (US Patent No. 5,843,236) in view of Ohmi et al (EP 1 032 097 A2), Shinji et al (JP 62-152127) and Kou et al (US Patent No. 6,246,75) as applied to Claim 7 and further in view of Hiroshi et al (US Patent No. 5,389,154).**

Regarding Claim 8: Yoshiki et al in view of Ohmi et al, Shinji et al and Kou et al teach all limitations of the claim except that microwave introducing means includes microwave branching means.

Hiroshi et al teach an ECR plasma apparatus (Figure 1) comprising:

a plasma generation chamber 20, magnetic coils 50, waveguide 33 with dividing circuit 64 (microwave branching means comprising of microwave branching portion 37 – page 16, lines 15-25 of the specification) [column 6, lines 40-60].

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use microwave introducing means which include branching and binding means as taught by Hiroshi et al in the apparatus of Yoshiki et al in view of Ohmi et al, Shinji et al and Kou et al to enable control formation of node and the phase of the magnetic fields of microwaves (column 7, lines 15-50).

Regarding Claims 9, 11: Hiroshi et al teach that apparatus is an ECR plasma apparatus.

Regarding Claims 10, 12: Yoshida et al teach the apparatus comprises rolls 14, 15 (sample moving means for moving large sized objects on page 8, lines 10-22) around which a sheet shaped object 13 (rectangular area of surface of sample) to be processed is wound and moved for processing the same (page 15, lines 60-67).

### *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rakesh K. Dhingra whose telephone number is (571)-272-5959. The examiner can normally be reached on 8:30 -6:00 (Monday - Friday).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571)-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Rakesh Dhingra



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Art Unit 1763